

is reached so that magnetic reconnection occurs, releasing energy stored in the distorted magnetic fields. Electrons are accelerated and non-thermal radio waves and other electromagnetic radiations are produced. That periods of magnetic evolution can occur in active regions without flares suggests strongly that energy can be dissipated and magnetic field distortions relaxed without invoking flares. That is at variance with the assumption of extremely high electrical conductivity in solar magnetic fields used in modelling the dynamics and statics of non-flaring active regions. There are topological and observational arguments for magnetic reconnection and energy dissipation in non-flaring active regions. Flares only take place when the dissipation rate is inadequate and a threshold is reached. The rates of energy dissipation in flares are compared with the evolutionary state and magnetic complexity of more than 50 active regions occurring over a period of 13 days close to the maximum of Cycle 21. The results strongly support the hypothesis. Flare activity very sharply favours complex active regions which are growing rapidly.

Magnetic Cartography of A and B Stars, G.A. Wade, University of Western Ontario.

An understanding of magnetism in A and B stars is necessary in order to explore the many peculiar phenomena associated with such objects. Our ability to construct detailed maps of the magnetic structure of these stars is steadily improving as we obtain and model new kinds of data. This paper describes current field mapping techniques and some recent results for several Ap stars.

INTERSTELLAR MEDIUM

The Spectral Index of the Crab Nebula, M.F. Bietenholz, York University, N. Kassim, Naval Research Laboratory, D.A. Frail and R.A. Perley, National Radio Astronomy Observatory, W.C. Erickson, University of Maryland, and A. Hajian, Cornell University.

We present the results of a new, comprehensive investigation of the radio spectral index of the Crab Nebula supernova remnant. New data at 74 MHz are combined with data at 325 MHz, 1.5 GHz and 5 GHz. Little spatial variation in the spectral index is seen. In contrast to some other recent workers, we see no steepening at the location of the filaments or near the edge of the nebula. At 74 MHz we see, for the first time, evidence of free-free absorption by the thermal material in the Crab Nebula's filaments.

An Analytic Description of a Magnetic Field for a Superbubble, B.D. Frei, R.N. Henriksen, and J.A. Irwin, Queen's University.

We present an analytic description of a possible magnetic field configuration for a galactic superbubble. Within the scale size of one bubble the field is shown to meet the constraints imposed by Maxwell's equations and the physical geometry of a sheared expanding shell. A coupling of the differential rotation and the vertical component of the magnetic field is revealed. Furthermore, equipartition of energy is assumed in order to show that the analytic field matches the velocity field obtained by Kamaya *et al.* (1996) using two-dimensional numerical magnetohydrodynamic simulations. The analytic field can be fit to the data for observed superbubbles and used to further investigate the evolution of such structures.

REFERENCE

Kamaya, H., Mineshige, S., Shibata, K. & Matsumoto, R. 1996, ApJ, 458, L28